



Ballistic Body Armor: A Closer Look at the Follow-Up Inspection and Testing Program

by Michele R. Coppola

The NIJ program helps ensure that body armor coming off the assembly line meets the requirements of NIJ's standard.

In the mid-1970s, NIJ began developing performance standards for body armor to help provide confidence that law enforcement officers are properly and consistently protected each and every time they face gunfire in the line of duty. Since that time, body armor has been credited with saving the lives of more than 3,100 law enforcement officers.¹

NIJ's most recent body armor standard — *Ballistic Resistance of Body Armor, NIJ Standard-0101.06*, published in July 2008 — establishes minimum performance requirements and test methods for the ballistic resistance of body armor designed to protect the torso against gunfire (see sidebar, "Revising the Body

Armor Standard," on page 15). Although this standard and all other NIJ standards are voluntary — that is, manufacturers are not required to follow them — many public safety agencies require compliance with NIJ standards before they purchase equipment. Through the NIJ Compliance Testing Program (CTP), manufacturers can voluntarily submit equipment samples for testing by NIJ-approved laboratories to determine whether their models comply with a particular standard.

The National Law Enforcement and Corrections Technology Center System's National Center (NLECTC-National) oversees NIJ's body armor conformity assessment efforts.



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With funding from NIJ, NLECTC-National administers two distinct phases of conformity assessment through the CTP. Phase 1 involves documenting the design of an armor model and testing up to 28 samples voluntarily submitted by manufacturers to verify that the model meets the standard’s minimum performance requirements. Models that meet the standard are added to the Compliant Products List, which can be found at <http://www.nij.gov/topics/technology/body-armor/compliant-ballistic-armor.htm>.²

But how do we ensure that recently manufactured body armor is constructed similarly to samples that were previously tested and deemed compliant with the NIJ standard?

This is where phase 2 comes in. NLECTC-National began implementing the second part of the conformity assessment effort, called the Follow-Up Inspection and Testing Program, in 2010. The program subjects new armor samples to additional ballistic testing and compares the construction of newly made armor with samples evaluated in phase 1, providing confidence that body armor coming off the assembly line is manufactured consistently and performs in accordance with NIJ standards.

“The follow-up program provides an additional set of eyes and ears into the manufacturing process,” said Lance Miller, NLECTC-National director. “We want to ensure that the men and women who wear these vests on a daily basis have as much confidence in these products as we can possibly give them.”

How the Program Works

The follow-up program applies to armor models deemed compliant

with the 2008 NIJ standard. Each month, the CTP staff reviews the number of models a manufacturer currently has on the Compliant Products List that have not been inspected within the past 10 months and prepares a list of models and manufacturers for follow-up inspection.

Independent inspectors conduct surprise inspections at these manufacturers’ locations. If a manufacturer does not agree to this follow-up inspection and testing, its armor will not remain on the Compliant Products List.

The inspectors randomly select two newly manufactured vests

for each identified model of interest and send them to NIJ-approved, accredited laboratories for testing. The laboratories send the test results to Underwriters Laboratories, an independent, not-for-profit testing and certification organization, for processing. Meanwhile, the laboratories send the vests to CTP staff, who also inspect the armor’s construction. Both steps — the laboratory testing and the inspection of construction — help ensure that the manufacturer has built the newly manufactured vest the same way as vests previously submitted for phase 1 testing.

What Inspectors Found

Inspectors conducted their first follow-up inspection in September 2010. Through August 2012, they had visited 90 manufacturing locations in five countries (United States, Canada, Mexico, Colombia and the People’s Republic of China) and tested 222 body armor models, according to Jamie Phillips, NLECTC-National conformity assessment coordinator. Of those models, five sustained multiple perforations during laboratory testing. Subsequently, the manufacturers issued recalls and replaced more than 1,750 fielded

Revising the Body Armor Standard

NIJ anticipates that a Special Technical Committee will begin revising the ballistic-resistant body armor standard in 2013. As a first step, NIJ has held workshops to obtain comments and suggestions from manufacturers of body armor. It also held a “needs and requirements” meeting, during which officers identified the operational environments in which they work, missions and roles performed while wearing armor, and other equipment that may be affected while wearing armor.

armors to ensure that practitioners had effective ballistic body armor that complied with the NIJ standard. The manufacturers also took corrective actions to fix what was causing the perforations.

"Staff at NIJ and NLECTC have worked actively with manufacturers to identify the root cause of these performance issues," explained Miller. "In cases where it was a significant issue, manufacturers voluntarily took immediate action to recall and replace units or take some sort of corrective action out in the field."

To date, inspectors have discovered eight models with major variations in construction that could affect ballistic performance. For example, in one case, the number of layers in the follow-up testing vest samples differed from those in the original samples; in another, leaking covers allowed water to penetrate to the ballistic panel. Inspectors also identified

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33 models with minor variations in construction that would not affect ballistic performance. In response, manufacturers worked with the CTP team to implement quality-control improvements at several locations to prevent these and other variations in construction.

Moving Forward Together

Inherent to the follow-up inspection process is increased communication between body armor manufacturers and the assessors.

"The program provides an opportunity to work more closely with manufacturers to ensure that fielded armor is more likely to comply with the NIJ standard," Phillips said. "It allows manufacturers to express their concerns, and we, in turn, are able to explain the reasons behind our decisions and how those decisions support the law enforcement community as a whole."

NIJ does not anticipate major changes to the follow-up process, but staff will continue to explore opportunities for improvement. "I think we view it in the same light as the entire Compliance Testing Program," Miller noted. "We view the standard itself as a living, breathing document that is flexible and can adapt to changing trends in the industry and new testing methods, and I don't see the follow-up program as any different."

"We obviously have learned much," he added. "As we continue this dialogue with manufacturers, we continue to learn more about the body armor manufacturing processes and how quality management in that industry works. And as we learn more, we will adapt the program."

NIJ's Body Armor Challenge

Most law enforcement agencies replace their body armor every three to five years — the typical length of the manufacturer's warranty. However, scientists suspect that the ballistic performance of an individual vest may vary due to a variety of physical, chemical and environmental factors.

In September 2012, NIJ issued the first Department of Justice Challenge, asking scientists, inventors and innovators to submit creative ways to test the performance and usability of body armor without destroying it. The goal of the challenge is to empower those who depend on this critical safety equipment to make informed decisions based on solid scientific evidence regarding the ballistic performance of the body armor they use. Winners of the first phase of this multiphase challenge are expected to be announced in March 2013. To read the challenge, visit <http://www.nij.gov/funding/2012/body-armor-challenge.htm>.

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For more information:

- Visit http://www.justnet.org/body_armor/index.html or contact NIJ Program Manager Michael O'Shea at michael.oshea@usdoj.gov.

Notes

1. DuPont, "IACP/DuPont Kevlar Survivors' Club," Wilmington, Del.: Author, 2012. Retrieved December 3, 2012, from <http://www2.dupont.com/personal-protection/en-us/dpt/article/kevlar-survivors-club.html>.
2. There is a similar list for stab-resistant body armor: <http://www.nij.gov/nij/topics/technology/body-armor/compliant-stab-armor.htm>.



Learn more about body armor: <http://www.nij.gov/topics/technology/body-armor/welcome.htm>.



Watch how body armor works to ensure that it keeps officers safer: <http://nij.ncjrs.gov/multimedia/video-body-armor-officer.htm>.

See how procurement officials can find the right vest for each officer: <http://nij.ncjrs.gov/multimedia/video-body-armor-purchasing.htm>.

THE NIJ CONFERENCE

Looking Back to See the Future of Prison Downsizing



Recent declines in U.S. prison populations have caused many reformers to suggest that America's experiment with mass incarceration is ending. But current prison downsizing policies may well backfire if

we fail to heed the lessons learned from the intermediate sanctions movement of the 1990s. Delivering the keynote address at the 2012 NIJ Conference, Joan Petersilia summarized these lessons and discussed why we must consider

them if we want to reverse — for good — four decades of prison expansion.

► Watch Petersilia's keynote address at <http://nij.ncjrs.gov/multimedia/video-nijconf2012-laub-petersilia.htm>.

Two plenary sessions from the 2012 NIJ Conference are also available for viewing:

► **Game Change:** How Researcher-Practitioner Partnerships Are Redefining How We Study Crime at <http://nij.ncjrs.gov/multimedia/video-nijconf2012-opening-plenary.htm>.

► **Protecting Our Protectors:** Using Science to Improve Officer Safety and Wellness at <http://nij.ncjrs.gov/multimedia/video-nijconf2012-closing-plenary.htm>.